UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,336	06/20/2006	Wei Du	P07314US00	6731

22885 7590 03/28/2008
MCKEE, VOORHEES & SEASE, P.L.C.
801 GRAND AVENUE
SUITE 3200
DES MOINES, IA 50309-2721

EXAMINER	
CUTLIFF, YATE KAI RENE	

ART UNIT	PAPER NUMBER
1621	

MAIL DATE	DELIVERY MODE
03/28/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,336	DU ET AL.	
	Examiner	Art Unit	
	YATE K. CUTLIFF	1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 September 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/21/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mukherjee, K.D. et al. (Applied Microbiology and Biotechnology, 1996, vol. 44, pp 558, 560, 561), Wagner, R.B. et al. (Synthetic Organic Chemistry, 1965, pp 486-487), and Shimada, Y. et al. (Journal of the American Oil Chemists' Society, 1999, vol. 76, no. 7, pp 789, 790 and792).

5. The rejected claims cover, inter alia, 1. A process for synthesizing biodiesel from renewable oils, comprising: carrying out a transesterification reaction, in the presence of an enzyme catalyst, between a low carbon fatty acid ester RCOOR' as an acyl acceptor and a renewable oil, wherein the molar ratio of the low carbon fatty acid ester to the renewable oil is in the range of from 3:1 to 20:1, the transesterification reaction producing a glycerine tri-(low carbon) carboxylic ester by-product, and reacting the glycerine tri-(low carbon) carboxylic ester by-product with a low carbon alcohol R'OH to obtain the low carbon fatty acid ester, wherein the low carbon fatty acid ester is capable of being recycled in a further round of biodiesel synthesis, wherein R and R' are independently selected from the group consisting of alkyls with one to four carbon atoms. The enzyme used in the process is either Candida antarctica or Rhizomucor miehei. The remaining dependent claims set out the reaction temperature, weight percentage for the enzyme, carbon fatty acid ester to renewable oil, identify the carbon fatty acid ester, and identify the renewable oil source.

Mukherjee et al. discloses a process for enrichment of very-long chain mono-unsaturated fatty acids by lipase-catalysed hydrolysis and transesterification. Two of the lipase used in the transesterification reaction are Rhizomucor miehei and Candida

antarctica. Also, the transesterification reaction process discloses the use of ethyl, propyl or butyl acetate with the reaction temperature of 20 - 22°C. The molar ratio of acetate to triacylglycerol is 8:1; the weight percentage of the enzyme is 10% of the total substrates. The reaction takes place in the absence of a solvent. The resulting products are alkyl esters and a mixture of acetylacylglycerols, diacetylmonoacylglycerols and acylglycerols. (see page 558, column 2, paragraphs 4 and 7. Table 4 shows the reaction time and products when Rhizomucor miehei is the catalyst.

Mukherjee et al. fails to disclose the additional step of transesterification of the glycerine by-product of the first step to produce a low carbon fatty acid ester, then taking that newly produced low carbon fatty acid ester and cycling it into the first step for a continuation of the reaction process. Nor does Mukherjee et al. disclose that the by-product is biodiesel fuel.

Wanger et al. discloses the basic alcoholysis of esters. (see page 486-487)

Shimada et al. discloses a process of conversion of vegetable oil to biodiesel using Rhizomucor and Candida antarctica lipase in an alcoholysis reaction. Additonally, Shimada et al. states that in the alcoholysis reaction Candida lipase gave the highest ester conversion among the lipases tested. Further, Shimada et al. discloses the continual conversion of vegetable oil to corresponding methyl esters. (see page 792 column 1, paragraph 1).

Biodiesel fuel is generally known in the art to be comprised of mono-alkyl esters of long chain fatty acids. The products of Mukherjee et al. are long chain mono-alkyl

esters and even though the Mukherjee et al. does not specifically identify the products final use, based on the definition of biodiesel fuel, one of ordinary skill in the art would presume that the products of Mukherjee et al. can be used as biodiesel.

It is a fact that Shimada et al. does not disclose the use of the low carbon fatty acid ester as its acyl acceptor in its biodiesel production, however, it is also a fact, as disclosed by Shimada that in the industrial production of biodiesel, continual conversion of vegetal oil to the corresponding fatty acid methyl esters is a standard practice. As such Applicant's claimed second step that transesterified the glycerin produced by the fist step and using it in a further round of biodiesel synthesis is especially obvious to an industrial level process. This limitation is deemed to be obvious absent a showing of unexpected results. A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill in the art might reasonably infer from the teachings. *(In reOpprecht* 12 USPQ 2d 1235, 1236 (Fed Cir. 1989); *In re Bode* 193 USPQ 12 (CCPA) 1976).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to use a known technique for synthesizing biodiesel from renewable oils as disclosed in Mukherjee et al., and then take the glycerine by-product and conduct a known alcoholysis reaction as suggested by Wagner et al. to produce fresh low carbon fatty acid ester that can be used in a cautious reaction process as suggested by Shimada et al. with a reasonable expectation of success.

Variations of particular work available in one field of endeavor may be prompted by design incentives and other market forces, either in same field or different one, and if person of ordinary skill in art can implement predictable variation, 35 U.S.C. §103 likely bars its patentability; similarly, if particular technique has been used to improve one device, and person of ordinary skill would recognize that it would improve similar devices in same way, then using that technique is obvious. KSR International co. v. Teleflex Inc., 550 U.S. at _____, 82 USPQ2D 1385 (U.S. 2007).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YATE K. CUTLIFF whose telephone number is (571)272-9067. The examiner can normally be reached on M-TH 8:30 a.m. - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on (571) 272 - 0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Yaté K. Cutliff
Patent Examiner
Group Art Unit 1621
Technology Center 1600

/Samuel A. Barts/
Primary Examiner
Art Unit 1621